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A facile synthetic route to convert Tb(III) complexes of novel tetra-1,3-diketone calix[4]resorcinarene into hydrophilic luminescent colloids

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Abstract

The work presents the synthesis of a novel calix[4]resorcinarene cavitand bearing four 1,3-diketone groups at the upper rim and its complex formation with Tb(iii) ions in DMF and DMSO solutions. Electrospray ionization mass spectra, 1H NMR, UV-Vis and luminescence spectra indicate a long (three hours at least) equilibration time for the complex formation between the cavitand and Tb(iii) in alkaline DMF and DMSO solutions. These results are explained by the restricted keto-enol conversion, resulting from the steric hindrance effect of the methylenedioxy-groups linking the benzene rings within the cavitand framework. A facile synthetic route to convert luminescent Tb(iii) complexes of various stoichiometries into luminescent hydrophilic colloids is disclosed in this work. The route is based on the reprecipitation of the Tb(iii) complexes from DMF to aqueous solutions with further polyelectrolyte deposition without prior separation of the luminescent complexes. The luminescent colloids exhibit high stability over time and in buffer systems, which is a prerequisite for their applicability in analysis and biolabeling.

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